

# IDAHO WATER RENTAL - RESIDENT F&W IMPACTS - PHASE III

9106700

## SHORT DESCRIPTION:

Quantify changes in resident fish and wildlife habitat in the upper Snake basin resulting from the release of water (427,000 acre-feet) from upper Snake River reservoirs (upstream of Hell's Canyon Dam complex) for anadromous fish flow augmentation. Develop a monitoring plan to routinely track water releases and habitat changes.

## SPONSOR/CONTRACTOR: IDFG

Idaho Department of Fish and Game

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## SUB-CONTRACTORS:

N/A There are no subcontractors associated with this project.

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## GOALS

### GENERAL:

Supports a healthy Columbia basin, Maintains biological diversity, Maintains genetic integrity, Increases run sizes or populations, Adaptive management (research or M&E)

### RESIDENT FISH:

Research, M&E

### NPPC PROGRAM MEASURE:

2.2E.7; 5.5A.1

### RELATION TO MEASURE:

Section 2.2E.7 asks the fish managers to address the trade-offs between resident fish and wildlife affected by upriver reservoir releases and anadromous fish affected by flow augmentation releases. This project is attempting to quantify changes in resident fish habitat resulting in salmon flow augmentation releases from the upper Snake River Basin (upstream of Brownlee Reservoir). Section 5.5A.1 calls on the states and tribes to review, compile, and submit information on impacts of anadromous flow augmentation on resident fish and wildlife. This project is reviewing and compiling that information.

### TARGET STOCK

Yellowstone cutthroat Mountain whitefish

Bull trout

Redband/rainbow trout

White sturgeon

### LIFE STAGE

### MGMT CODE (see below)

N,W N

N, P, W

N, W

N, W

### AFFECTED STOCK

### BENEFIT OR DETRIMENT

Warmwater fish assemblage (includes but is not restricted to catfish, bass crappie, perch, bullhead, bluegill)

Brown trout

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## BACKGROUND

### STREAM AREA AFFECTED

#### Stream name:

Snake River mainstem (Brownlee Pool - confluence of Henrys Fork and South Fork); South Fork Snake River; Payette River; Boise River

#### Subbasin:

Mid Snake-Powder; Mid Snake-Boise; Upper Snake River; Snake Headwaters; Payette River; Boise River

#### Stream miles affected:

Snake River mainstem = 561; Payette River subbasin

= 169; Boise River subbasin = 107

#### **Hydro project mitigated:**

N/A The project does not mitigate for any specific hydro project.

#### **Habitat types:**

All stream habitats

#### **HISTORY:**

This project is part of and subject to the terms of the Non-Treaty Storage Fish and Wildlife Agreement (June 1990) between BPA and CBFWA and is related to the Non-Treaty Storage Agreement between the U.S. and Canada. Phase I summarized resource information and provided management recommendations to protect and enhance resident fish and wildlife habitat relative to storage releases for the improvement of anadromous fish migration. Phase II summarized biological, legal, and political developments, provided a biological appraisal of an area between American Falls Reservoir and the city of Blackfoot, and included an accounting of the 1993-94 salmon flow augmentation releases out of the upper Snake, Boise, and Payette River systems.

#### **BIOLOGICAL RESULTS ACHIEVED:**

Phase I of the project was completed in October 1992 and included the identification of existing resident fish and wildlife resources in the upper Snake River basin, habitat conditions, management recommendations, and water release strategies designed to protect or enhance resident fish and wildlife and their habitats. Phase II began in February 1993 and focused on a biological appraisal (IFIM) of resident fish and wildlife habitat in the upper Snake River between American Falls reservoir and the city of Blackfoot. The of this appraisal was to gather fish and wildlife habitat data on a portion of the Snake River that had been dewatered in 1992 due to irrigation diversions. The appraisal mapped fish and wildlife habitat, developed habitat versus flow curves for several species of fish (rainbow trout, cutthroat trout, and whitefish) and wildlife (Canada goose, mallard duck, beaver), and validated the findings of an earlier Shoshone-Bannock flow study. Phase III is concentrating on developing a model in which annual requests for salmon flow augmentation and impacts to resident fish and wildlife are quantified through time using weighted usable area and habitat units. Changes to the quantity of white sturgeon and rainbow trout habitat were determined for the Snake River from CJ Strike Dam downstream to Brownlee Pool resulting from the 1995 flow augmentation releases. Habitat changes were estimated for four life stages, adult, spawning, egg or fry, and juvenile or larvae.

#### **PROJECT REPORTS AND PAPERS:**

Idaho Water Rental Pilot Project Probability/Coordination Study, Resident Fish and Wildlife Impacts, Phase III. September 1996.  
Phase I Water Rental Pilot Project: Snake River Resident Fish and Wildlife Resources and Management Recommendations. October 1992.  
Phase II Water Rental Pilot Project: Snake River Resident Fish and Wildlife Resources and Management Recommendations. November 1994.

#### **ADAPTIVE MANAGEMENT IMPLICATIONS:**

Fisheries managers can assess and quantify impacts to resident fish and wildlife habitat in the upper Snake Basin resulting from the water released for anadromous fish migration. Once the impacts are determined, timing and volume of flows can be shaped to maximize the benefits to resident fish and wildlife.

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## **PURPOSE AND METHODS**

#### **SPECIFIC MEASUREABLE OBJECTIVES:**

The objective is to be able to quantify changes in resident fish and wildlife habitat in the upper Snake basin upstream of Brownlee Reservoir resulting from the water released for juvenile salmon migration and develop and recommend optimal release strategy for the water such that it maximizes benefits to resident fish and wildlife.

#### **CRITICAL UNCERTAINTIES:**

The water released for salmon will actually make it through the system to benefit resident fish, wildlife, and anadromous fish.

#### **BIOLOGICAL NEED:**

In its biological opinion, the National Marine Fisheries Service has instructed the BOR to release 427,000 AF of water per year from the upper Snake River Basin (upstream of Hell's Canyon Dam complex) to aid juvenile salmon migration. The timing, volumes, duration, and locations of the water released is critical to the health and stability of the Snake River watershed. Releasing water at the wrong time, or at the wrong volume, or for the wrong length of time could have very serious detrimental impacts to the resident fish and wildlife in the upper Snake River and tributaries. On the other hand careful, planned releases taking into consideration fish and wildlife impacts could greatly benefit the fish and wildlife in the Snake River basin. This project will determine what is the best way to release the water to maximize the benefits to resident fish and wildlife upstream of the Hell's Canyon Dam complex.

#### **HYPOTHESIS TO BE TESTED:**

Increased flows in the upper Snake River basin significantly affect resident fish and wildlife habitat.

#### **ALTERNATIVE APPROACHES:**

N/A No other alternative approaches were considered.

#### **JUSTIFICATION FOR PLANNING:**

N/A The project does not focus on planning, assessment, or coordination. It focuses on evaluating and modifying an action associated with ESA.

#### **METHODS:**

Quantify habitat versus flow relationships using existing data. We want to extrapolate to areas where data does not exist using regression techniques, simple expansion or extrapolation to areas with similar habitat, or PHABSIM models. Develop a monitoring program through linking with the Bureau of Reclamation's (BOR), Idaho Department of Water Resources (IDWR), and US Geological Survey's (USGS) flow databases (using real - time flow data) in order to track the water through the system. We will verify this with field observations. Habitat changes will be quantified for sturgeon, bull trout, cutthroat trout, redband trout, whitefish, Canada goose, mallard duck, and beaver (and perhaps other wildlife as well). Impacts to reservoir fisheries will also be monitored. Recommendations will be developed for the volume and timing of releases to maximize benefits to resident fish and wildlife. This data will be used in the development of loss assessments, biological and integrated rule curves, as well as biological objectives for the management of the Snake River basin.

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## **PLANNED ACTIVITIES**

#### **SCHEDULE:**

<b><u>Planning Phase</u></b>	<b><u>Start</u></b> 1991	<b><u>End</u></b> 1997	<b><u>Subcontractor</u></b>
<b><u>Task</u></b> 1997 - The major tasks are to quantify habitat changes from the 1996 flow releases, develop the monitoring plan, and make flow recommendations for future releases. 1998 - 2000 - Activities are the same as for 1997 with the addition of the development of biological objectives based on the data and habitat versus flow relationships for the Snake River and tributaries, quantification of changes to reservoir habitat, use this data to develop biological and integrated rule curves and begin operational loss assessments for federal hydropower projects in the Snake River.			
<b><u>Implementation Phase</u></b>	<b><u>Start</u></b> 1995	<b><u>End</u></b> 2000	<b><u>Subcontractor</u></b>
<b><u>Task</u></b> 1997 - The major tasks are to quantify habitat changes from the 1996 flow releases, develop a monitoring plan, and make flow recommendations for future releases. 1998-2000 - The activities are the same as for 1997 with the addition of the development of biological objectives based on the data and habitat versus flow relationships for the Snake River and tributaries. Implementation of the monitoring plan. Final recommendations on a water release scenario to benefit resident fish.			

#### **PROJECT COMPLETION DATE:**

2000

#### **CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:**

One risk is that Idaho Power or the BOR do not work with us when deciding how and when and where to release the water. Another

er risk is that all there is not enough existing data to be able to accurately estimate or quantify habitat changes resulting from the water releases for salmon.

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## OUTCOMES, MONITORING AND EVALUATION

### SUMMARY OF EXPECTED OUTCOMES

#### **Expected performance of target population or quality change in land area affected:**

A model that relates changes in flow to changes in resident fish and wildlife habitat, a monitoring plan that tracks the water through the system, and a set of guidelines that show when, where, and how much water should be released to maximize benefits to resident fish and wildlife. The latter is, in essence, biological rule curves. Also, biological objectives for the Snake River and several tributaries should be ready for the Council to adopt into the Fish and Wildlife program. The data and models generated here will be incorporated into the resident fish loss assessment project (#9501400). The expected change in target organisms if recommendations are implemented include healthier, increasing populations of weak native fish (redband trout, bull trout, cutthroat trout, white sturgeon), improved water quality in the Snake River Basin, improved riparian health in the Snake River Basin.

#### **Present utilization and conservation potential of target population or area:**

Present use of target species is limited due to the depressed status of most native stocks in the Snake River Basin. There is a catch and release fishery on white sturgeon. It has been gaining in popularity in recent years. Bull trout are closed to harvest. Sport fishing for other stocks varies depending on the strength of the stock. Harvest of all the other stocks is greatly reduced or eliminated through special fishing regulations. The potential of all these stocks is tremendous. They are recoverable.

#### **Assumed historic status of utilization and conservation potential:**

Historic use of these stocks is assumed to have been very high, but details are limited. There were commercial fisheries for salmon and steelhead in the Snake River below Shoshone Falls (and above the present location of Hells Canyon Dam). There was a commercial sturgeon fishery below Swan Falls around the turn of the century to feed the miners in the Silver City area. This commercial fishery lasted until the 1930's or 40's. Historic use of salmonids in the Henrys Fork is known to have been high. The fishery was well known even before much development existed. There was also a commercial fishery for salmonids on Henrys Lake.

#### **Long term expected utilization and conservation potential for target population or habitat:**

The long term goal is to restore these native stocks to near their historic levels.

#### **Contribution toward long-term goal:**

The project could result in the implementation of a flow scenario that maximizes benefits to resident fish, greatly improves water quality (including decreased temperatures), and improves the health of the riparian ecosystem throughout much of the Snake River Basin.

#### **Indirect biological or environmental changes:**

The project might result in a reduction of undesirable nongame fish in the Snake River Basin by returning the hydrograph to a more natural pattern, thus improving habitat for native species, and decreasing habitat for undesirable non-native fish.

#### **Physical products:**

N/A There will not be any "physical products" as defined in the question associated with this project. Fish habitat for native species should increase. The amount of increase and location of the increase depends on how much water is released, when it is released, where it is released, and the rate or duration of release.

#### **Environmental attributes affected by the project:**

Overall water quality, should be improved. Water temperatures and sediment levels should decrease, salmonid and sturgeon habitat should increase. Flows in the mainstem Snake River and several tributaries should increase (Boise, Payette, South Fork Snake).

**Changes assumed or expected for affected environmental attributes:**

It is anticipated that water quality will increase due to the increased volume of water in the channel. Improvements include lower water temperatures, decreased sediment levels, reduced nutrient levels (nitrogen, phosphorus etc) and reduced levels of other organic and inorganic pollutants due the increased flushing action caused by the increased flows. Flows in the Snake River will increase by at least 1500cfs between Milner Dam and the Boise River during the summer. Flows in the Boise River will increase by 400cfs for 2 - 3 months out of the year. Flows in the Payette will increase during the summer and winter. The releases have been split between summer and winter, in part, to help maintain as high a pool level as possible in Cascade Reservoir, thus reducing water quality problems there. Habitat for sturgeon and native salmonids will increase with increased flow releases. This should result in increased populations of these fish. Only habitat changes will be measured. Population response, water quality changes, pollution levels, sediment levels etc. will not be directly measured with this project.

**Assessment of effects on project outcomes of critical uncertainty:**

Careful monitoring of the flow releases at gaging stations throughout the basin with the help of IDWR and the BOR will tell us if the water is remaining in the river. If it isn't, the flow records will reveal this, and fish habitat will be reduced accordingly.

**Information products:**

The project will produce an evaluation of the impacts to native resident fish from past water releases and will provide recommendation for when, where, how much, and rate of release to maximize benefits to native resident fish. This will be done through quantified changes in fish habitat based on IFIM habitat versus flow relationships.

**Coordination outcomes:**

Phase 1 of the project was completed in October 1992 and included the identification of existing resident fish and wildlife resources in the upper Snake River Basin, habitat conditions, management recommendations, and water release strategies designed to protect or enhance resident fish and wildlife and their resources. Phase 2 began in February, 1993 and focused on a biological appraisal of resident fish and wildlife habitat in the upper Snake River between American Falls Reservoir and the city of Blackfoot. The purpose of the biological appraisal was to gather fish and wildlife habitat information in a portion of the Snake River that had been dewatered in 1992 due to irrigation diversions. The appraisal mapped fish and wildlife habitat, developed habitat versus flow curves for several species of fish and wildlife, and validated the findings of an earlier Shoshone-Bannock flow study. Current Phase 3 work will coordinate the development of an upper Snake River Basin resident fish and wildlife model in which annual requests for salmon flow augmentation and impacts to resident fish and wildlife are quantified through time in weighted useable area (WUA) and habitat units (HUs). Coordination is taking place through the Snake River Anadromous Fish Water Management Committee, the Water Rental Technical Group, and the BOR's Snake River Resources Review Project.

**MONITORING APPROACH**

Quantify habitat versus flow relationships using existing data. We want to extrapolate to areas where data does not exist using regression techniques, simple expansion or extrapolation to areas with similar habitat, or PHABSIM models. Develop a monitoring program through linking with the Bureau of Reclamation's (BOR), Idaho Department of Water Resources (IDWR), and US Geological Survey's (USGS) flow databases (using real - time flow data) in order to track the water through the system. We will verify this with field observations. Habitat changes will be quantified for sturgeon, bull trout, cutthroat trout, redband trout, whitefish, and maybe Canada goose, mallard duck, and beaver. Impacts to reservoir fisheries will also be monitored. Recommendations will be developed for the volume and timing of releases to maximize benefits to resident fish and wildlife. This data will be used in the development of loss assessments, biological and integrated rule curves, as well as biological objectives for the management of the Snake River basin.

**Provisions to monitor population status or habitat quality:**

There are no provisions to monitor habitat or population status in this project. Some fish habitat was measured and mapped in Phase II. There may be some ground truthing of the flows if the need is there and budgets allow. Other related projects (not yet funded) will measure and monitor populations and habitats (Idaho Loss Assessment and Snake River Native Salmonid Assessment).

**Data analysis and evaluation:**

The only data resulting from this project is flow data from various gaging stations in the upper Snake Subregion. This data is act

usually obtained by IDWR and/or BOR and sent to IDFG. These flows are then compared to known habitat versus flow relationships to estimate the quantity of habitat available to target species and life stages. These habitat estimates represent the habitat available with the flow augmentation water. The data received by IDFG also contains an accounting of how much of the total flow (in cfs) is salmon augmentation water. This volume is subtracted from the total flow and habitat is estimated for this reduced flow. Habitat is then estimated for the reduced flow using the same relationships. This habitat estimate represents the amount of habitat that would have been present if the flow augmentation water was not present. The two habitat estimates are then subtracted to get net gain or loss of habitat for a each species and life stage.

#### **Information feed back to management decisions:**

The results from this project will be forwarded to policy makers and fish managers in the upper Snake River Subregion to be used in negotiations with other stakeholders to improve native resident fish habitat in the Subregion. The results of this project will also be incorporated in the BOR's Snake River Resources Review Project. This should help their Decision Support System by giving it more flexibility and power by making it possible to look at impacts of various flow scenarios on resident fish and wildlife.

#### **Critical uncertainties affecting project's outcomes:**

Critical uncertainties could be resolved by the development of a more comprehensive monitoring system involving the BOR, IDWR, the water users, Idaho Power Company, etc. so that the accounting of water accurately represents where the water is in the Basin on a real time basis. The accounting needs to be much more detailed. It should line out exactly where all the water releases are from (i.e. which reservoir rather than water district), how much is going to each purpose (e.g. hydropower flow, irrigation flow, instream flows, salmon flow augmentation etc.). This should make water use and accounting much easier to track. Also, research is needed to ground truth the flow versus habitat relationships developed through IFIM in years past. This data is currently being used in the project. Research is needed to determine if there are any actual fish population responses, and water quality responses (including temperature and sediment) to the changes in flow resulting from salmon flow augmentation releases in the upper Snake Subregion.

#### **EVALUATION**

Performance indicators include quantified changes in resident fish habitat resulting from flow augmentation releases. A model that predicts changes in habitat with changes in flow. Recommendations on when, where, how much, and at what rate to release flow augmentation water to maximize benefits to resident fish. The real proof that flow augmentation is successful is outside the scope of this project. That is documenting actual resident and anadromous fish population responses.

#### **Incorporating new information regarding uncertainties:**

This project is taking an adaptive management approach to problems, new information, and uncertainties. As more information becomes available or problems arise, the project will adjust or be modified as best as possible without changing the overall goal.

#### **Increasing public awareness of F&W activities:**

This project meets periodically with other stakeholders in the Basin - BOR, USFWS, IPC, Shoshone-Bannock Tribes, IWUA, IDWR, etc. Also, this project is directly related to the BOR's Snake River Resources Review project (SR3). This is a large, multi-faceted, upper Snake River Subregion wide project that deals directly with all stakeholders and anyone interested in the upper Snake River Basin. Here the public is involved in all aspects of the project. The link between water rental and SR3 provides good access by the public to water rental.

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## **RELATIONSHIPS**

### **RELATED BPA PROJECT**

5501900 Genetic Analysis of Snake River Salmonids. This project will identify current stocks of native salmonids throughout the upper Snake River Subregion through genetic profiles.

### **RELATIONSHIP**

The genetic information together with information from project #5502000 above will provide critical information for targeting stocks for protection and restoration. The water rental project will provide the information (flow and habitat needs) required for implementing protection and restoration efforts.

5502000 Snake River Native Salmonid Assessment. the project will determine the status of native salmonids throughout the upper Snake River Subregion, identify threats to existence, and identify and implement protection and restoration actions.

The water rental project will provide useful, quantified information concerning habitat versus flow requirements for native salmonids in several of the upper Snake subbasins. This information should be very useful in identifying and implementing protection and restoration actions.

#### **RELATED NON-BPA PROJECT**

Snake River Resources Review/Bureau of Reclamation

#### **RELATIONSHIP**

This project is building a decision support system (DSS) to improve the overall management of the upper Snake River Subregion. The DSS will allow managers to make better informed decisions on water management in the Upper Snake. They will be able to see and analyze the trade-offs (benefits and risks) of different management (or water release) strategies. Information from the water rental project is being incorporated directly into the DSS so that impacts to fisheries from various flow scenarios can be evaluated.

#### **OPPORTUNITIES FOR COOPERATION:**

Phase I and II involved the following cooperators, the BOR, IDWR, USGS, Idaho Parks and Recreation, Idaho Division of Environmental Quality, Idaho Water Users Association, University of Idaho, Idaho Power, and US Fish and Wildlife Service. Phase III has dealt primarily with habitat versus flow relationships, so the cooperators have been reduced to a technical team of biologists from IDFG, BOR, US Fish and Wildlife Service, Idaho Power, and the Idaho Water Users Association (IWUA).

#### **COSTS AND FTE**

**1997 Planned:** \$114,720

#### **FUTURE FUNDING NEEDS:**

<u>FY</u>	<u>\$ NEED</u>	<u>% PLAN</u>	<u>% IMPLEMENT</u>	<u>% O AND M</u>
1998	\$125,000	0%	100%	0%
1999	\$125,000	0%	100%	0%
2000	\$125,000	0%	100%	0%
2001	\$0	0%	0%	0%
2002	\$0	0%	0%	0%

#### **PAST OBLIGATIONS (incl. 1997 if done):**

<u>FY</u>	<u>OBLIGATED</u>
1991	\$85,123
1993	\$145,470
1994	\$119,770
1995	\$46,381
1996	\$98,776

**TOTAL:** \$495,520

Note: Data are past obligations, or amounts committed by year, not amounts billed. Does not include data for related projects.

#### **OTHER NON-FINANCIAL SUPPORTERS:**

BOR, USFWS, IPC, IWUA

**LONGER TERM COSTS:** N/A The project is not expected to last beyond 2002.

**1997 OVERHEAD PERCENT:** 19%

**HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:**

[Overhead % not provided so BPA appended older data.] Overhead applies to personnel and operating only, not capital outlay.

**SUBCONTRACTOR FTE:** N/A No subcontractors are used.

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**SUPPLEMENTAL RESIDENT FISH EVALUATION FACTORS:**

Although the purpose for this water (427,000 acre-feet) and the reason it is being released is to aid endangered juvenile anadromous fish migration to the ocean from the Snake River Basin below Hells Canyon Dam, the purpose of the project is to determine the impacts the release of this water has on resident fish (primarily) and wildlife (secondarily) in the upper Snake River Basin upstream of Brownlee Reservoir. If this water was properly shaped, it could have additional benefits - especially to weak native resident fish stocks in the upper Snake River Basin. The major thrust of this project is to determine how to shape this water to maximize benefits to these weak, native resident stocks.